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(54) **Fibrin sealant applicator**

Auftragevorrichtung eines Klebers auf Fibrinbasis

Applicateur d'agent de scellement à base de fibrine

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EP 0 858 775 B1

Description

BACKGROUND

1. Technical Field

[0001] The disclosure relates generally to an applicator for applying a tissue sealant based on human or animal proteins and more particularly to an apparatus for applying an adhesive formed by combining solutions of the proteins to tissues or organs for sealing wounds, stopping bleeding and the like. An applicator for dispensing fluids, which discloses in combination the features of the pre-characterizing portion of claim 1 below, is disclosed in FR-A-2 651 485.

2. Description of Rdated Art

[0002] A fibrin sealant is a biological adhesive formed by mixing two protein components, namely, fibrinogen and thrombin. Each protein component is derived from human plasma and is subjected to virus elimination procedures. The components are typically individually dehydrated and stored in separate vials as sterile freeze-dried powders.

[0003] It is known that purified fibrinogen and thrombin, together with a variety of known adjuvants, can be combined in vitro to produce a polymer having great potential benefit, both as a hemostatic agent and as a tissue adhesive. Because of the rapid polymerization upon intimate interaction of fibrinogen and thrombin, it is important to maintain these two blood proteins separate until applied at the application site. These protein solutions are generally delivered by devices such as a dual syringe apparatus.

[0004] One dual syringe apparatus for applying a fibrinogen-based tissue adhesive is disclosed in U.S. Pat. No. 4,359,049 to Redl et al. Redl et al. disclose a mechanism in which two standardized one-way syringes are held in a support having a common actuating means. The dispensing end of each syringe is inserted into a collection manifold where the two components are mixed. The components are then dispensed through a common needle capable of covering a limited area of the application site.

[0005] It is often desirable or necessary to cover a broad area of a wound, either to stop bleeding, to fix tissue or to prevent infection. It is also desirable to prevent the two components from mixing within the dispensing device.

[0006] Further, all known devices for dispensing solutions of fibrinogen and thrombin require the addition of these proteins in powdered form to the body of the syringe. This makes the proteins susceptible to contamination by impurities which may enter the syringe body. Further still, the use of the syringe body to mix the proteins with water to create the protein solutions can cause the solutions to leak out from either the dispensing end of each syringe or the proximal end of the syringe body.

[0007] Additionally, a dual syringe apparatus for the application of fibrinogen and thrombin solutions to an application site generally contains several parts, such as a syringe plunger, a "Y" manifold connector, a dispensing needle, a syringe holder, syringe needles, and conduits for transporting the solutions to the dispensing needle. Therefore, known fibrin sealant applicators, such as disclosed in U.S. Patent to Redl et al. discussed above, and in U.S. Patent Nos. 4,874,368 to Miller et al. and 4,979,942 to Wolf et al. are difficult to reuse. The replenishment of the protein components typically require removing a clip which couples the syringe plunger, removing the syringe plunger, detaching the syringes from the "Y" connector, removing the syringes from the holder, inserting new syringes, affixing the syringes to the "Y" connector, adding fibrinogen to one syringe and thrombin to another syringe, adding sterile water to each syringe, replacing the syringe plunger, replacing the plunger clip, and mixing the solutions. In an application where time is of the essence, such a lengthy replenishing process is impractical and cumbersome.

[0008] Furthermore, known applicators for dispensing a biological adhesive require the manual exertion of a force on the protein components so they can be dispensed from the applicator. Typically, a manual force is exerted on the components by means of the plunger in the standard one-way syringe. This type of arrangement is shown in U.S. Patent Nos. 4,359,049 discussed above, and 4,631,055 to Redl et al. Manually exerting. a force on a plunger located at proximal end of the applicator can make the application of the adhesive difficult. For example, the user is unable to clearly view the application site when holding the applicator perpendicularly to the application site. Further, such an arrangement causes air to enter the syringes causing difficulty in exerting a force via the syringe plunger.

[0009] Thus, there is a need in the art for a fibrin sealant applicator wherein the adhesive covers a broad area of a wound, either to stop bleeding, to fix tissue or to prevent infection. There is also a need for a fibrin sealant applicator wherein a manual force is applied via an activator assembly having a mechanism for preventing air from entering reservoirs containing the solutions. Further, there is a need for a fibrin sealant applicator wherein the adhesive components are not susceptible to contamination and the adhesive components are not intermixed within the applicator.

[0010] In addition, there is a need for a fibrin sealant applicator wherein the component solutions are easily replenished. There is also a need for a fibrin sealant applicator which is self-cleaning and reusable with different component solutions. Further, there is a need for a fibrin sealant applicator which is inexpensive to manufacture for allowing the applicator to be disposed of after use. Additionally, there is a need for a fibrin sealant applicator which avoids wasting adhesive solution and allows the application site to be clearly seen by the user

when applying the component solutions perpendicular to the application site.

SUMMARY

[0011] An applicator in accordance with the invention is defined in claim 1 below. The applicator is for dispensing a first and a second component of a biological adhesive. The applicator includes a housing having a housing head for enclosing therein a first reservoir containing the first component, and a second reservoir containing the second component. The housing further includes an elongated body portion defining a longitudinal axis for enclosing therein a conduit assembly having a first and a second conduit in communication with the first and second reservoir, respectively. An activator assembly is provided which includes an activator and a rachet mechanism for compressing the reservoirs within the housing to dispense the biological components into the conduits. An applicator tip having two separate channels in communication with the conduits may be provided on a distal end of the elongated body portion for dispensing the components at the application site. The first and second components are preferably fibrinogen and thrombin which intermix to form a fibrin sealant.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Various embodiments are described herein with reference to the drawings, wherein:

FIG. 1 is a perspective view of a preferred embodiment of a fibrin sealant applicator;
FIG. 2 is a perspective exploded view of the embodiment of FIG. 1;
FIG. 2A is an enlarged view of a rachet member on an activator assembly shown by FIG. 1;
FIG. 3 is a cross-sectional top view of the embodiment of FIG. 1;
FIG. 4 is a perspective view of the reservoir assembly depicted in FIG. 2;
FIG. 4A is a perspective view of the embodiment of FIG. 1 showing the placement of the reservoir assembly of FIG. 4 within the housing;
FIG. 5 is an enlarged view of an alternative embodiment of the reservoir assembly;
FIG. 5A is a perspective view of an alternative embodiment of the applicator showing the placement of the reservoir assembly of FIG. 5 therein;
FIG. 6 is an enlarged perspective view of a preferred applicator tip having phantom channels and boresights for dispensing the components;
FIG. 7 is a cross-sectional view taken along line 7 in FIG. 3 showing the activator assembly in an inactivated state;
FIG. 7A is an enlarged view of the rachet mechanism;
FIG. 8 is a cross-sectional view showing the activator assembly in an activated state;
FIG. 8A is an enlarged view of the rachet mechanism guiding the activator;
FIG. 9 is a cross-sectional view showing the activator assembly in a fully compressed state;
FIGS. 10-10B are enlarged views of an alternative collapsible reservoir;
FIGS. 11-11A are cross-sectional views of an alternative reservoir having a frangible partition for separating a protein component from a liquid;
FIGS. 12-12A are perspective views of the distal end of the applicator having bellows for effectuating articulation of the applicator tip;
FIGS. 13-13A are perspective views of an alternative distal end of the applicator having a sleeve and a shape memory tube for varying the angular position of the applicator tip;
FIGS. 14-14A are perspective views of an alternative distal end of the applicator having an angular cut;
FIG. 15 is an enlarged view of an alternative distal end of the applicator having a straight and a circular conduit;
FIG. 16 is a perspective view of an alternative distal end of the applicator having an absorbable pad on each conduit;
FIG. 17 is an enlarged view of the applicator having coaxial conduits;
FIG. 18 is a perspective view of an applicator having a drum activator in an inactivated state;
FIG. 18A is a top perspective view of the applicator of FIG. 18;
FIG. 18B is a cross-sectional view taken along line 18B in FIG. 18A;
FIG. 18C is a top prospective view of the applicator of FIG. 18 showing the drum activator in a fully activated state;
FIG. 18D is a cross-sectional view taken along line 18D in FIG. 18C;
FIG. 19 is a perspective view of an applicator having a hinged-plate activator;
FIG. 19A is a cross-sectional view taken along line 19A in FIG. 19; and
FIG. 19B is a cross-sectional view of the applicator of FIG. 19 showing the hinged-plate activator in a fully activated state.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0013] Referring to FIG. 1, a fibrin sealant applicator according to a preferred embodiment of the present disclosure is shown. The applicator designated generally by numeral 10 includes a housing 12 having a housing head 14 and an elongated body portion 16 defining a longitudinal axis. Housing head 14 contains a conically-shaped distal end 18 having a bore 20 in the center thereof dimensioned to receive body portion 16. While

the housing head 14 is shown as being rectangular, it is understood that other shapes that contribute to the ease of gripping and controlling the applicator 10 may be used.

[0014] The housing head 14 includes an opening 20 for receiving an activator assembly 22 having an activator 24 for effectuating the dispensing of biological components as further described below. An applicator tip 26 is provided at a distal end 28 of the body portion 16 having two boresights 30 for dispensing biological components contained within housing head 14. In the preferred embodiment, the biological components are a fibrinogen solution and a thrombin solution which intermix to form a fibrin sealant. It is to be understood, however, that other biological fluids may be substituted, depending upon the choice of mixture that is to be dispensed.

[0015] The internal components of housing 12 will now be discussed in detail with reference to FIGS. 2-5A. As shown in FIG. 2, housing 12 is formed from molded housing half sections 12a and 12b which are formed with internal partitions configured to properly align the internal components of the applicator 10 with respect to each other and to prevent movement of the components. The internal components of the applicator 10 include a reservoir assembly 32 and a conduit assembly 34. The two assemblies are interrelated with each other and with the activator assembly 22 discussed above.

[0016] Reservoir assembly 32 includes a first 36 and second reservoir 38, and two plugs 40. First reservoir 36 and second reservoir 38 are preferably constructed from a flexible material and contain the first and second biological components, respectively. A window 37 on housing half-section 12a will permit a user to view the contents within the first 36 and second reservoir 38. First 36 and second reservoir 38 include a first cylindrical extension 42 having a central throughbore 44 at a distal end 46, a second cylindrical extension 48 having a central throughbore 50 at a proximal end 52. Central throughbore 50 is used for placing the biological components in the reservoirs 36 and 38- Plug 40 is used to vacuum seal central throughbore 50 to prevent contamination of the biological components. The plug 40 includes a silicon surface 56 capable of being penetrated by a syringe needle for adding a liquid, preferably sterile water, within reservoirs 36 and 38 to intermix with the biological components to form protein solutions. The protein solutions are dispensed' on the application site, as further discussed below.

[0017] The conduit assembly 34 includes two conduits 58 each having a nozzle 60 for matingly engaging the cylindrical extension 42 on first 36 and second reservoir 38 for connecting conduit assembly 34 to reservoir assembly 32. The conduit assembly 34 is mounted within housing 12 as illustrated by the dotted lines in FIG. 2 Two phantom channels 61 within applicator tip 26, each leading to one of the two boresights 30, are preferably press fitted to the distal end of the conduits 58 for providing fluid communication between the conduit assembly 34 and the applicator tip 26.

[0018] FIG. 2A is an enlarged view of a portion of the activator assembly 22. As described in greater detail below, the activator assembly 22 controls the pressure exerted on reservoirs 36 and 38, and includes the activator 24 and a rachet member 62. The activator 24 includes an activation area 64, a shaft 66, and a disc 68. The shaft 66 connects the activation area 64 with the disc 68. The rachet member 62 extends downwardly from disc 68 and includes teeth 70 for engaging teeth 72 on an inner extension 74 of housing 12 to form structure for controlling the position of the activator 24. The control structure is a rachet mechanism 73. The rachet member 62 is preferably formed integral with the disc 68. Activator 24 may be formed with a transparent material or with a transparent window therein to permit viewing of the internal components of the applicator 10.

[0019] An assembled cross-sectional, top view of the applicator 10 illustrating the flow of the protein solutions is shown by FIG. 3. The protein solutions are kept separated to prevent intermixing and the creation of a fibrin sealant within the applicator 10. Upon exertion of pressure on activator 24, components are forced through conduit assembly 34 to applicator tip 26.

[0020] FIG. 4 illustrates a preferred embodiment of the reservoir assembly 32. The first and second reservoir 38 are identical for encasing an equal volumetric amount of their respective protein solution as compared to the other reservoir. It is contemplated to provide a different color for each reservoir 36 and 38 to easily recognize the reservoir containing fibrinogen and the reservoir containing thrombin. It is further contemplated to provide a different shape for each reservoir for the same purpose. However, the volumetric amount stored within the first reservoir 36 should be equal to the volumetric amount stored within the second reservoir 38 to maintain a pre-determined fibrinogen to thrombin solution ratio, which is typically a 1:1 ratio.

[0021] A perspective view of the reservoir assembly 32 of FIG. 4 as placed within housing 12 is illustrated by FIG. 4A. It is contemplated that the first 36 and the second reservoir 38 are manufactured from a transparent plastic for being able to view the amount of solution and to determine if the solution has been sufficiently intermixed before being dispensed on the application site. It is further contemplated to provide calibration markings on the first 36 and second reservoir 38. It is additionally contemplated that reservoir assembly 32 is permanently affixed to the conduit assembly 34. In such an embodiment, the reservoir assembly 32 and the conduit assembly 34 can be disposed'of after each use and new reservoir and conduit assemblies can be fitted to applicator 10.

[0022] FIGS. 5 and 5A illustrate an alternative embodiment of applicator 10 and reservoir assembly 32. Reservoir assembly 76 illustrated by FIG. 5 includes a first 78 and second reservoir 80 having cylindrical extensions 82 fitted with plugs 84 for sealing the components.

The applicator illustrated by FIG. 5A and designated generally by numeral 86 is identical to applicator 10 without entry holes 54; with a different partition layout on housing half-section 12b and with a different connecting method for connecting reservoirs 78 and 80 with conduit assembly 88. Specifically, conduit assembly 88 includes nozzles 90 having a syringe needle (not shown) in a center thereof for penetrating surface 92 on plugs 84. The protein solution are dispensed to conduit assembly 94 via the syringe needles. Two mounts 96 are provided to conduit assembly 88 to create a force directed towards the proximal end of applicator 86 when reservoirs 78 and 80 are forced against the syringe needles to permit the syringe needles to penetrate surface 92 of each plug 84.

[0023] An enlarged view of the preferred embodiment of applicator tip 26 is illustrated by FIG. 6. The applicator tip 26 is preferably made from a metallic alloy capable of being sterilized and includes a cylindrical proximal end 97 and an applicator head 98. Further, as mentioned above, applicator tip 26 includes two channels 61 for matingly engaging conduits 58. Each channel 61 extends through the applicator tip 26 to one of the two boresights 30 for dispensing the protein solutions to the application site. The cylindrical proximal end includes a clasping button 100 for matingly engaging a hole 102 in body portion 16. When applicator tip 26 is connected to body portion 16, a circumferential surface 104 dividing the cylindrical proximal end 96 with the applicator head 106 is made flush with a distal end surface 108 of body portion 16.

[0024] The operation of applicator 10 will now be described in detail with reference to FIGS. 7-9. FIG. 7 depicts the applicator 10 with the activator 24 in an inactivated state As illustrated by FIG. 7A, the activator 24 is maintained in the inactivated state by the rachet mechanism 73 which has teeth 70 on rachet member 62 for lockingly engaging teeth 72 on the inner extension of 74 of housing 12.

[0025] Referring now to FIGS. 8 and 8A, there is illustrated the activator assembly 22 in an activated state. By exerting pressure to the activation area 64, the rachet mechanism 73 guides the activator 24 downwardly and the shaft 66 is forced further into the housing 12. As the shaft 66 enters the housing 12, the rachet mechanism 73 and the disc 68 compress reservoir 36 to dispense the protein solution via nozzle 60 into conduit assembly 34.

[0026] When ceasing to exert pressure to the activation area 64, the activator 24 is prevented from returning to the inactivated state by the rachet mechanism 73. As a result air cannot be sucked into the reservoirs 36 and 38 causing difficulty in further compressing reservoirs 36 and 38. Further, the position of the activator 24 with respect to housing half-section 12a provides a reference as to the amount of solution remaining in the first 36 and second reservoir 38. For example, when the activator 24 is in a fully activated state, as shown by FIG. 9, there is a small amount of solution left in the first 36 and second reservoir 38.

[0027] Referring to FIGS. 10-10B, there is illustrated an alternative embodiment of a reservoir designated generally by numeral 150. Reservoir 150, as reservoir 36, includes includes plug 40 to vacuum seal central throughbore 50 and the cylindrical extension 42 for connecting to the conduit assembly 34. However, unlike reservoir 36 which is constructed from a flexible material, reservoir 150 is constructed from a collapsible or non-flexible material which prevents the reservoir 150 from resuming its original, uncompressed shape as depicted by FIG. 10 after being compressed. As shown by FIGS. 10A and 10B, after the reservoir 150 is compressed, it does not resume its original, uncompressed shape.

[0028] An alternative reservoir is illustrated by FIGS. 11 and 11A and is designated generally by numeral 110. Reservoir 110 is identical to reservoir 36, but with the addition of a frangible partition 112. The partition 112 separates the dehydrated protein 114 with the mixing liquid 116. The frangible partition 112 is broken by applying pressure to the collapsible reservoir 110, as indicated by the arrows in FIG. 11A, to mix the ingredients therein to form the protein solution.

[0029] Although four embodiments for the reservoirs have been illustrated and described, it is to be understood that the applicator 10 could be fitted with any of a number of different reservoirs, including, without limitation, syringes, bags or tubing. Furthermore, although the preferred embodiment for the reservoir assembly 32 has but two reservoirs, it is to be understood that additional reservoirs containing other solutions can be incorporated within applicator 10.

[0030] FIGS. 12-17 illustrate alternative embodiments for the distal end of applicator 10. FIGS. 12 and 12A illustrate body portion 16 being provided with bellows 118 for effectuating articulation of the applicator tip 26 for altering the dispensing angle with respect to longitudinal axis of the body portion 16.

[0031] FIGS. 13 and 13A illustrate body portion 16 having shape memory metal 120 for altering the dispensing angle as sleeve 122 is moved proximally. The memory metal 120 resumes a straight configuration when sleeve 122 is pushed distally as shown by the arrow in FIG. 13A.

[0032] With reference to FIGS. 14 and 14A, there is illustrated another embodiment for altering the dispensing angle. In this embodiment, applicator tip 26 has been removed and the distal end of body portion 16 is provided with an angular cut 124 having approximately a 45° angle with respect to the longitudinal axis. The conduits 58 have curved distal ends to align with the 45° angular cut 124 for dispensing the protein solutions at a 45° angle from the longitudinal axis.

[0033] FIGS. 15 and 16 illustrate two additional alternative embodiments for the distal end of body portion 16. These embodiments include conduits which extend beyond the distal end of body portion 16.

[0034] The embodiment of FIG. 15 includes one straight conduit 126 and one conduit 128 having a circular configuration 130. The circular configuration 130 is provided with holes 132 on a side 134 facing the center of the circular configuration 130. One of the protein solutions exits the applicator 10 via holes 132 on conduit 128. This protein solution is intermixed with the protein solution which exits conduit 126. The embodiment of FIG. 15 is best suited for providing the fibrin sealant on small incisions or cuts which can be localized by circular configuration 130.

[0035] The embodiment of FIG. 16 includes pads 136 fitted at the distal end of conduits 138. The pads 136 are formed of a sponge-like material capable of absorbing the protein solutions. The pads 136 are used to spread the protein solutions on the application site. This embodiment is best suited for external wounds or larger internal site configuration.

[0036] With reference to FIG. 17, there is illustrated an alternative embodiment for body portion 16. Two coaxial paths 140 and 142 are formed within body portion 16. In this embodiment, a portion of conduits 58 are used to transport the protein solutions from the first 36 and second reservoir 38 to the proximal end of body portion 16 where they dispense the protein solutions within coaxial paths 140 and 142. The paths 140 and 142 transport the solutions to the application site. It is contemplated that the paths 140 and 142 have an identical volumetric capacity for transporting an equal amount of each solution to the application site.

[0037] As mentioned earlier, reference will now be made to two alternative activator assemblies not belonging to the present invention.

[0038] FIG. 18 illustrates an applicator designate generally by numeral 200 having a housing 202 including a housing head 204 and an elongated body portion 206. An applicator tip 208 is provided at distal end 210 of body portion 206. An activator assembly 211 is provided on housing head 204 having a first and a second set of lateral finger grips 212 and 214. The first set 212 is stationary and the second set 214 is configured for movement along two horizontal slots 216 provided on each side of housing head 204.

[0039] With reference to FIGS- 18A and 18B, a cylindrical drum 218 is affixed to the second set of lateral finger grips 214. When the activator assembly 211 is in an inactivated state, as shown by FIGS. 18A and 18B, the drum 218 rests against the proximal end of reservoirs 220 and 222. In an activated state, as shown by FIGS. 18C and 18D, the second set of lateral finger grips 214 are brought towards the first set 212. The forward lateral movement of the second set 214 translates the drum 218 over reservoirs 220 and 222 to dispense the protein solutions via nozzles 224 to conduit assembly 226. The relative position of the second set of lateral finger grips 214 to the first set 212 provides a reference regarding the amount of solution remaining in each reservoir 220 and 222.

[0040] The second alternative activator assembly will now be described with reference to FIGS. 19-19B, which depict an applicator designated generally by numeral 300. Applicator 300 includes an activator assembly 302 having a pair of hinged-plates 304 connected via hinge 306 and a slide 308. Housing 310 is provided with a cut-out portion 312 for guiding the slide 308 forward to create a plying action on reservoirs 314 and 316, as shown by the arrows in FIG. 19B, to dispense the protein solutions via nozzles 318 to conduit assembly 320. The relative position of the slide 308 along the cut-out portion 312 provides a reference regarding the amount of solution remaining in each reservoir 314 and 316.

[0041] It is also contemplated that conduits which have different diameters may be provided for allowing the biological components to be dispensed in different ratios. Further, but not according to the invention, an activator assembly may be provided which uses pressurized gas to dispense the components from the reservoirs.

[0042] Therefore, it is understood that various modifications may be made to the embodiments disclosed herein. For example, while specific preferred embodiments of the conduit, activator, rachet and reservoir assemblies, have been described in detail, structures that perform substantially the same function in substantially the same way to achieve substantially the same result can also be used. Also, besides applying a fibrin sealant, the fibrin sealant applicator can be used to perform human or veterinary surgical procedures including applying antiseptics, medication and other similar procedures. Therefore, the above description should not be construed as limiting, but merely as exemplifications of preferred embodiments. Those skilled in the art will envision other modifications within the scope of the claims appended thereto.

Claims

1. An applicator (10) for dispensing fluids via a conduit assembly (34) extending from an elongate housing (12) configured for operatively enclosing at least two self-contained collapsible reservoirs (36, 38) each having a longitudinal axis aligned with the longitudinal axis of the housing and each having a sealable opening therein and storing at least one fluid, the conduit assembly having a pair of conduits (58) in fluid communication with said housing, said applicator having an activator assembly (22) provided on said housing having an activator (24) moveable from a first position to a second position to decrease the volumetric capacity of said housing and substantially and simultaneously compress the at least two self-contained collapsible reservoirs to dispense the at least one fluid through at least one of said pair of conduits (58) to a distal end thereof,

   characterized in that

the activator (24) is arranged to move along an axis perpendicular to the longitudinal axis of the housing; and

the applicator is suitable for dispensing a multicomponent biological adhesive.

2. The applicator of claim 1, further comprising an applicator tip (26) having a pair of channels (61) each being in fluid communication with said distal end of one of said pair of conduits (58).

3. The applicator of claim 1, wherein said activator assembly (22) includes control structure for restricting said activator (24) from returning to said first position after the activator (24) is moved from said first position.

4. The applicator of Claim 3, wherein said control structure includes a ratchet mechanism (62).

5. The applicator of Claim 1, wherein each of said pair of conduits (58) includesindependent distal exits, such that said first and second components intermix external to said applicator (10).

6. The applicator of Claim 1, wherein said conduit assembly (34) further comprises a first nozzle (60) disposed about a first of said pair of conduits (58) and a second nozzle (60) disposed about a second of said pair of conduits (58).

7. The applicator of Claim 1, wherein said housing (12) defines a chamber configured to receive said at least one self-contained collapsible reservoir storing said at least one component of said multicomponent biological adhesive.

8. The applicator of Claim 1, wherein said activator (24) compresses said at least one self-contained collapsible reservoir as said activator (24) is moved from said first position to said second position for dispensing said at least one component through said at least one of said pair of conduits (58) to a distal end thereof

9. The applicator of Claim 1, wherein said housing (12) includes a housing head (14) for storing said reservoirs (36, 38) therein and an elongated body portion (16) extending from said housing head (14).

10. The applicator of Claim 1, wherein each of said reservoirs (36, 38) includes a frangible partition (112) therein for separating said at least one component from a liquid.

11. The applicator of Claim 12, wherein said reservoirs (36, 38) include a first portion containing said at least one component and a second portion containing said liquid divided by said frangible partition (112).

12. The applicator of Claim 11, wherein a distal end of said elongated body portion (16) includes structure for collectively altering the angle of dispensing of said at least one component at an angle with respect to a proximal end of the elongated body portion (16).

13. The applicator of Claim 14, wherein said means for altering the angle of dispensing includes bellows (118) for effectuating articulation of said distal end.

14. The applicator of Claim 14, wherein said means for altering the angle of dispensing includes a shape memory tube (120) in alignment with said body portion (16) and a sleeve (122) overlaying said tube (120), where said tube (120) assumes a different angular configuration with respect to a longitudinal axis of said body portion (16) as said sleeve (122) is moved proximally.

15. The applicator of Claim 14, wherein said means for altering the angle of dispensing includes providing an angular cut (124) to said distal end of said body portion (16) and curving a distal end of each of said pair of conduits (58) to align with said angular cut (124).

16. The applicator of Claim 1, wherein a first of said pair of conduits (58) includes a distal end having a circular configuration (130) aligned with a plurality of holes (132) on a side facing inward of said circular configuration (130), and a second of said pair of conduits (58) includes a distal end substantially above the circular configuration (130).

17. The applicator of Claim 1, wherein a distal end of each of said pair of conduits (58) includes a pad (136) for absorbing and spreading said at least one component.

18. The applicator of Claim 1, wherein said pair of conduits (58) are in coaxial arrangement (140, 142).

Patentansprüche

1. Applikator (10) zum Spenden von Fluids über eine Leitungsanordnung (34), die sich von einem länglichen Gehäuse (12) erstreckt, das zum betrieblichen Umschließen mindestens zweier unabhängiger, faltbarer Behälter (36, 38) ausgelegt ist, die jeweils eine zu der Längsachse des Gehäuses ausgerichtete Längsachse besitzen und jeweils eine abdichtbare Öffnung darin besitzen und mindestens ein Fluid speichern, wobei die Leitungsanord-

nung ein Paar von Leitungen (58) in Fluidverbindung mit dem Gehäuse besitzt, wobei der Applikator eine an dem Gehäuse vorgesehene Aktivatoranordnung (22) besitzt, die einen Aktivator (24) besitzt, der von einer ersten Position in eine zweite Position bewegbar ist, um die Volumenkapazität des Gehäuses zu vermindern und wesentlich und gleichzeitig die mindestens zwei unabhängigen, faltbaren Behälter zu komprimieren, um das mindestens eine Fluid durch mindestens eine des Paares von Leitungen (58) zu einem distalen Ende davon zu spenden,
dadurch gekennzeichnet, dass
der Aktivator (24) angeordnet ist, um sich entlang einer Achse senkrecht zu der Längsachse des Gehäuses zu bewegen; und
der Applikator zum Spenden eines biologischen Mehrkomponenten-Klebstoffs geeignet ist.

2. Applikator nach Anspruch 1, ferner umfassend eine Applikatorspitze (26), die ein Paar von Kanälen (61) besitzt, die jeweils in Fluidverbindung mit dem distalen Ende einer des Paares von Leitungen (58) ist.

3. Applikator nach Anspruch 1, wobei die Aktivatoranordnung (22) eine Steuerstruktur zum Hindern des Aktivators (24) vor einem Rückkehren in die erste Position, nachdem der Aktivator (24) von der ersten Position bewegt ist, aufweist.

4. Applikator nach Anspruch 3, wobei die Steuerstruktur einen Sperrklinkenmechanismus (62) aufweist.

5. Applikator nach Anspruch 1, wobei jede des Paares von Leitungen (58) unabhängige distale Ausgänge derart aufweist, dass sich die erste und die zweite Komponente außerhalb des Applikators (10) miteinander mischen.

6. Applikator nach Anspruch 1, wobei die Leitungsanordnung (34) ferner eine erste Düse (60), die um eine erste des Paares von Leitungen (58) vorgesehen ist, und eine zweite Düse (60), die um eine zweite des Paares von Leitungen (58) vorgesehen ist, aufweist.

7. Applikator nach Anspruch 1, wobei das Gehäuse (12) eine Kammer definiert, die zum Aufnehmen des mindestens einen, unabhängigen, faltbaren Behälters ausgelegt ist, welcher die mindestens eine Komponente des biologischen Mehrkomponenten-Klebstoffs lagert.

8. Applikator nach Anspruch 1, wobei der Aktivator (24) den mindestens einen, unabhängigen, faltbaren Behälter komprimiert, wenn der Aktivator (24) von der ersten Position in die zweite Position zum Spenden der mindestens einen Komponente durch mindestens eine des Paares von Leitungen (58) zu einem distalen Ende davon bewegt wird.

9. Applikator nach Anspruch 1, wobei das Gehäuse (12) einen Gehäusekopf (14) zum Lagern der Behälter (36, 38) darin und einen länglichen Körperabschnitt (16), der sich von dem Gehäusekopf (14) erstreckt, aufweist.

10. Applikator nach Anspruch 1, wobei jeder der Behälter (36, 38) eine zerbrechliche Trennung (112) darin zum Trennen der mindestens einen Komponente von einer Flüssigkeit aufweist.

11. Applikator nach Anspruch 10, wobei die Behälter (36, 38) einen ersten Abschnitt, welcher die mindestens eine Komponente enthält und einen zweiten Abschnitt, der die Flüssigkeit enthält, aufweist, welche durch die zerbrechliche Trennung (112) getrennt sind.

12. Applikator nach Anspruch 9, wobei ein distales Ende des länglichen Körperabschnitts (16) eine Struktur zum gemeinsamen Verändern des Spendewinkels der mindestens einen Komponente auf einen Winkel in Bezug auf ein proximales Ende des länglichen Körperabschnitts (16) aufweist.

13. Applikator nach Anspruch 12, wobei die Einrichtung zum Verändern des Spendewinkels einen Balg (118) zum Bewirken einer Artikulation des distalen Endes aufweist.

14. Applikator nach Anspruch 12, wobei die Einrichtung zum Verändern des Spendewinkels ein Formgedächtnisrohr (120) in Ausrichtung zu dem Körperabschnitt (16) und eine das Rohr (120) überlagernde Hülse (122) aufweist, wobei das Rohr (120) einen unterschiedlichen winkelmäßigen Aufbau in Bezug auf die Längsachse des Körperabschnitts (16) einnimmt, wenn die Hülse (122) proximal bewegt wird.

15. Applikator nach Anspruch 12, wobei die Einrichtung zum Verändern des Spendewinkels das Bereitstellen eines winkligen Schnitts (124) an dem distalen Ende des Körperabschnitts (16) und das Krümmen eines distalen Endes jeder des Paares von Leitungen (58), um eine Ausrichtung zu dem winkligen Schnitt (124) zu erzielen, aufweist.

16. Applikator nach Anspruch 1, wobei eine erste des Paares von Leitungen (58) ein distales Ende aufweist, das einen kreisförmigen Aufbau (130) besitzt und zu einer Mehrzahl von Löchern (132) auf einer nach innen gerichteten Seite des kreisförmigen Aufbaus (130) ausgerichtet ist, und eine zweite des

Paares von Leitungen (58) umfasst ein distales Ende im wesentlichen oberhalb des kreisförmigen Aufbaus (130).

17. Applikator nach Anspruch 1, wobei ein distales Ende jeder des Paares von Leitungen (58) ein Kissen (136) zum Absorbieren und Verteilen der mindestens einen Komponente aufweist.

18. Applikator nach Anspruch 1, wobei das Paar von Leitungen (58) in koaxialer Anordnung (140, 142) ist.

Revendications

1. Applicateur (10) pour distribuer des fluides par un ensemble de conduits (34) s'étendant d'un boîtier oblong (12) configuré pour renfermer fonctionnellement au moins deux réservoirs autonomes aptes à s'affaisser (36, 38) comportant chacun un axe longitudinal aligné avec l'axe longitudinal du boîtier, et chacun présentant une ouverture apte à être scellée à l'intérieur et stockant au moins un fluide, l'ensemble de conduits présentant une paire de conduits (58) en communication fluidique avec ledit boîtier, ledit applicateur comportant un ensemble formant activateur (32) prévu sur ledit boîtier comportant un activateur (24) déplaçable d'une première position à une seconde position pour diminuer la capacité volumétrique dudit boîtier et pour comprimer sensiblement et simultanément au moins deux réservoirs autonomes aptes à s'affaisser précités pour distribuer au moins un fluide précité à travers au moins l'un des deux conduits (58) à une extrémité distale de celui-ci,

   caractérisé en ce que

   l'activateur (24) est agencé pour se déplacer le long d'un axe perpendiculaire à l'axe longitudinal du boîtier ; et

   l'applicateur convient pour distribuer un adhésif biologique à composants multiples.

2. Applicateur selon la revendication 1, comprenant en outre une pointe d'applicateur (26) présentant deux canaux (61) chacun en communication fluidique avec ladite extrémité distale d'un des deux conduits (58).

3. Applicateur selon la revendication 1, où ledit ensemble formant activateur (22) comprend une structure de commande pour empêcher le retour dudit activateur (24) à ladite première position après que l'activateur (24) a été déplacé de ladite première position.

4. Applicateur selon la revendication 3, où ladite structure de commande comprend un mécanisme à rochet (62).

5. Applicateur selon la revendication 1, où chacun des deux conduits (58) comprend des sorties distales indépendantes de telle sorte que lesdits premier et second composants se mélangent à l'extérieur dudit applicateur (10) .

6. Applicateur selon la revendication 1, où ledit ensemble de conduits (34) comprend en outre une première buse (60) disposée autour d'un premier des deux conduits (58) et une seconde buse (60) disposée autour d'un second des deux conduits (58).

7. Applicateur selon la revendication 1, où ledit boîtier (12) définit une chambre configurée pour recevoir au moins un réservoir autonome apte à s'affaisser précité stockant au moins un composant précité dudit adhésif biologique à composants multiples.

8. Applicateur selon la revendication 1, où ledit activateur (24) comprime au moins un réservoir autonome apte à s'affaisser précité lorsque ledit activateur (24) est déplacé de ladite première position à ladite seconde position pour distribuer au moins un composant précité à travers au moins l'un des deux conduits (58) à son extrémité distale.

9. Applicateur selon la revendication 1, où ledit boîtier (12) comprend une tête de boîtier (14) pour stocker lesdits réservoirs (36, 38) à l'intérieur ainsi qu'une portion de corps oblongue (16) s'étendant de ladite tête de boîtier (14).

10. Applicateur selon la revendication 1, où chacun desdits réservoirs (36, 38) comprend une séparation cassante (112) à l'intérieur pour séparer au moins un composant précité d'un liquide.

11. Applicateur selon la revendication 10, où lesdits réservoirs (36, 38) comprennent une première portion contenant au moins un composant précité et une seconde portion contenant ledit liquide divisée par ladite séparation cassante (112).

12. Applicateur selon la revendication 9 , où une extrémité distale de ladite portion de corps oblongue (16) comprend une structure pour modifier collectivement l'angle de distribution d'au moins un composant précité selon un angle par rapport à une extrémité proximale de la portion de corps oblongue (16).

13. Applicateur selon la revendication 12, où ledit moyen pour modifier l'angle de distribution comprend un soufflet (118) pour permettre l'articulation de ladite extrémité distale.

14. Applicateur selon la revendication 12, où ledit moyen pour modifier l'angle de distribution comprend un tube à mémoire de forme (120) en alignement avec ladite portion de corps (16) ainsi qu'un manchon (122) reposant sur ledit tube (120), où ledit tube (120) prend une configuration angulaire différente par rapport à un axe longitudinal de ladite portion de corps (16) lorsque ledit manchon (122) est déplacé proximalement.

15. Applicateur selon la revendication $_{12}$, où ledit moyen pour modifier l'angle de distribution comprend la réalisation d'une coupe angulaire (124) à ladite extrémité distale de ladite portion de corps (16) et la courbure d'une extrémité distale de chacun des deux conduits (58) pour qu'il soit aligné avec ladite coupe angulaire (124).

16. Applicateur selon la revendication 1, où un premier des deux conduits (58) comprend une extrémité distale d'une configuration circulaire (130) alignée avec plusieurs trous (132) sur un côté orienté vers l'intérieur de ladite configuration circulaire (130), et un deuxième des deux conduits (58) comprend une extrémité distale sensiblement au-dessus de la configuration circulaire (130).

17. Applicateur selon la revendication 1, où une extrémité distale de chacun des deux conduits (58) comprend un coussinet (36) pour absorber et étaler au moins un composant précité.

18. Applicateur selon la revendication 1, où les deux conduits (58) sont agencés coaxialement (140, 142).

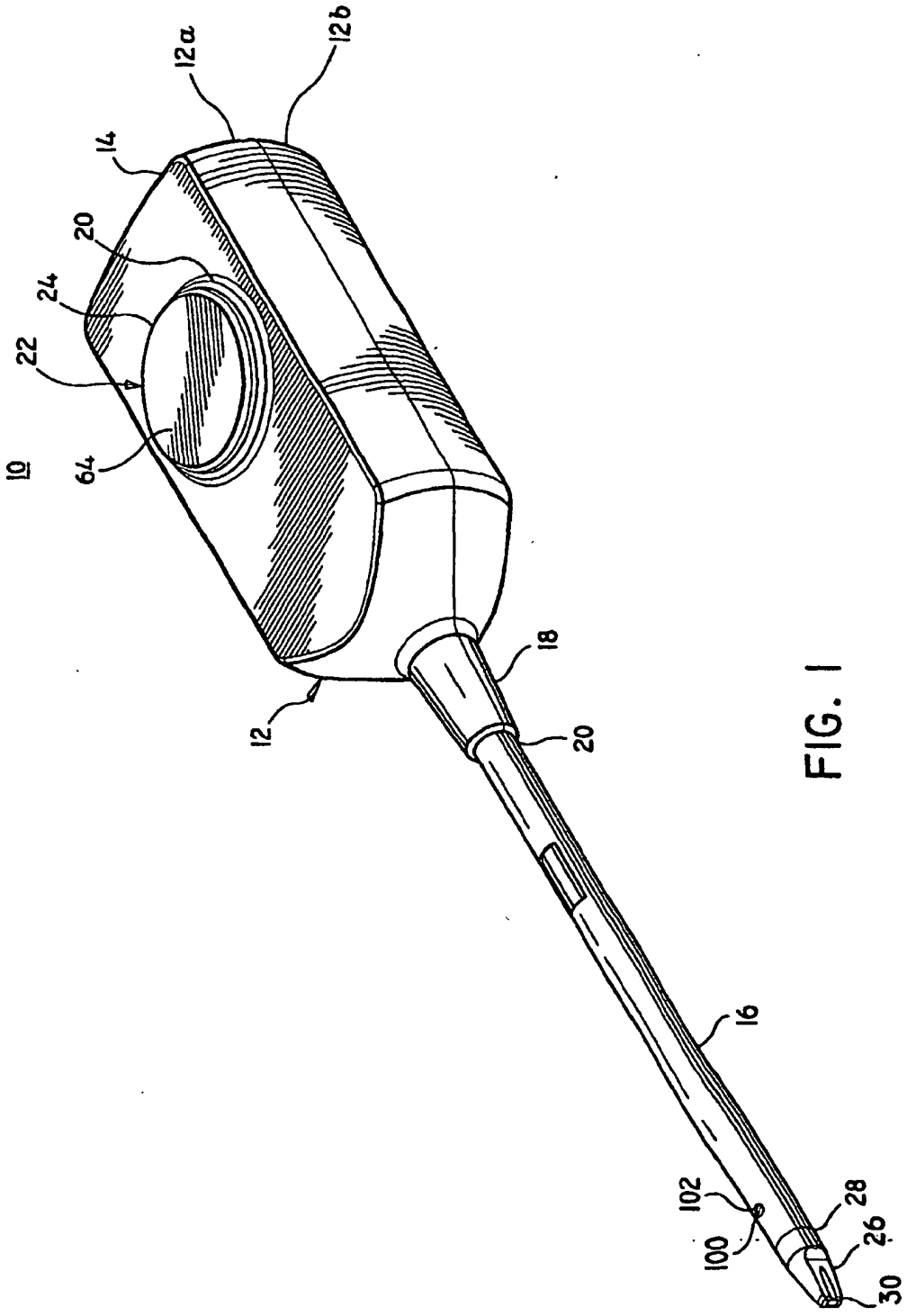
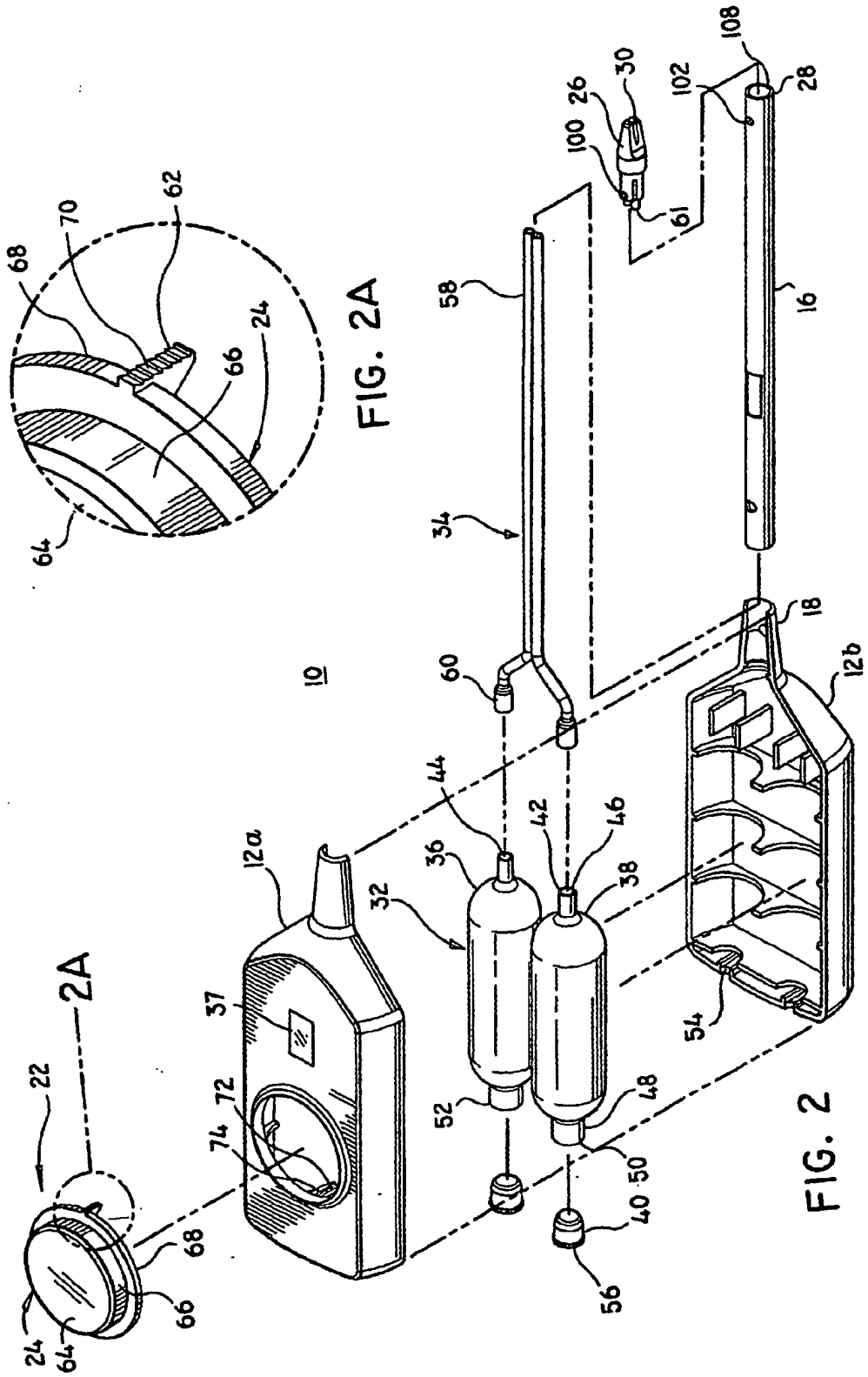


FIG. 1


10
12a
12b
16
18
22
24
26
28
30
32
34
36
37
38
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42
44
46
48
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52
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58
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64
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68
70
72
74
100
102
108
2A

FIG. 2

FIG. 2A

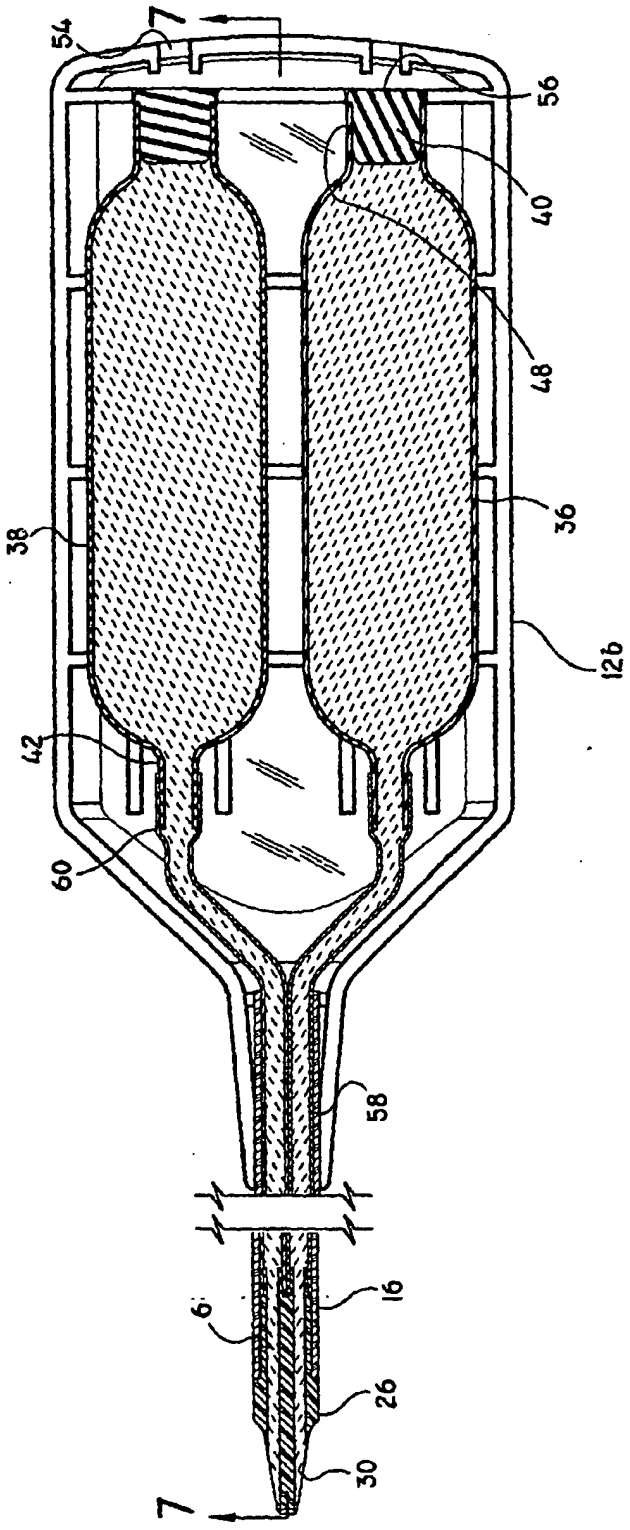

FIG. 3

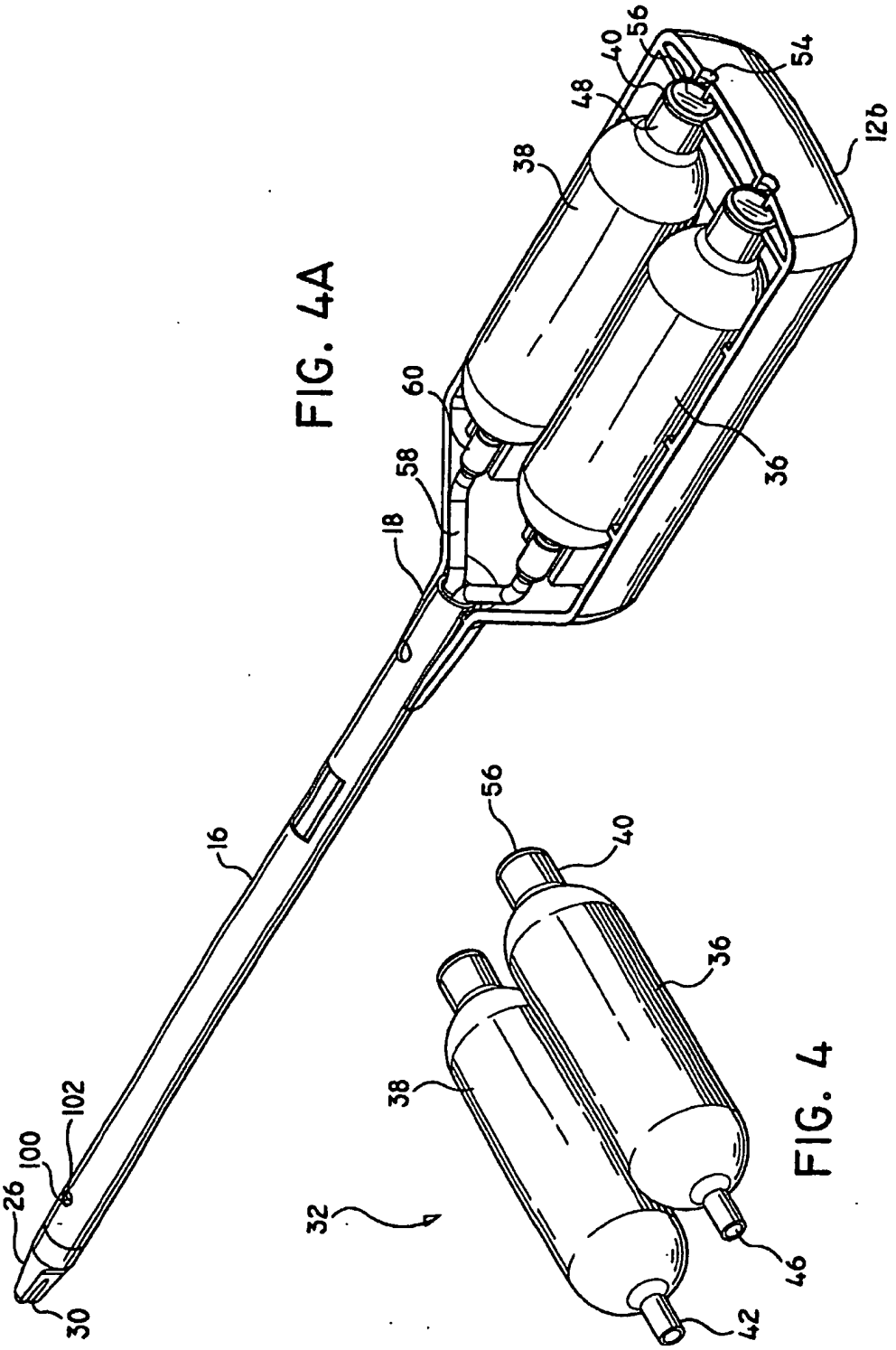

FIG. 4A

FIG. 4

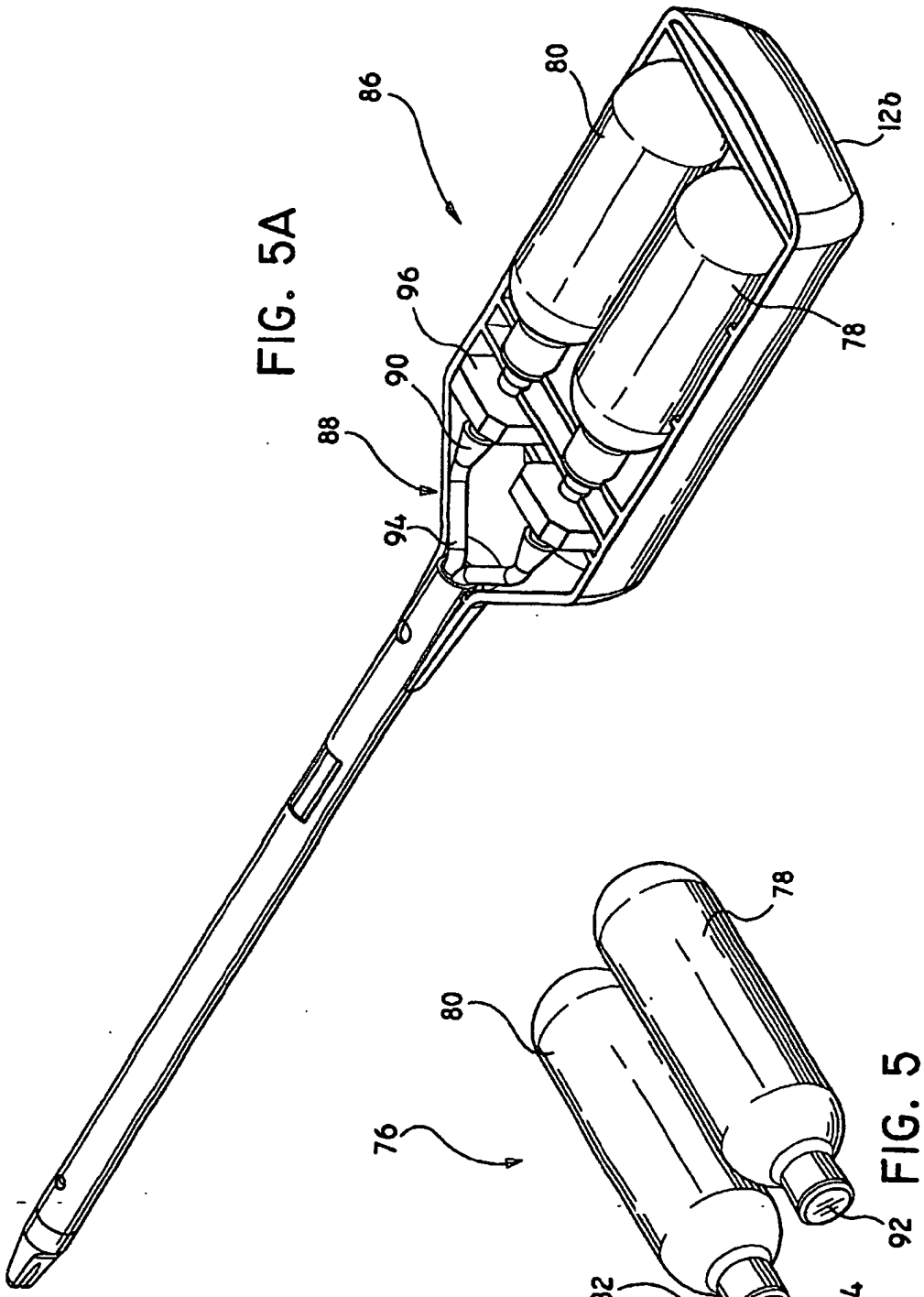

FIG. 5A

FIG. 5

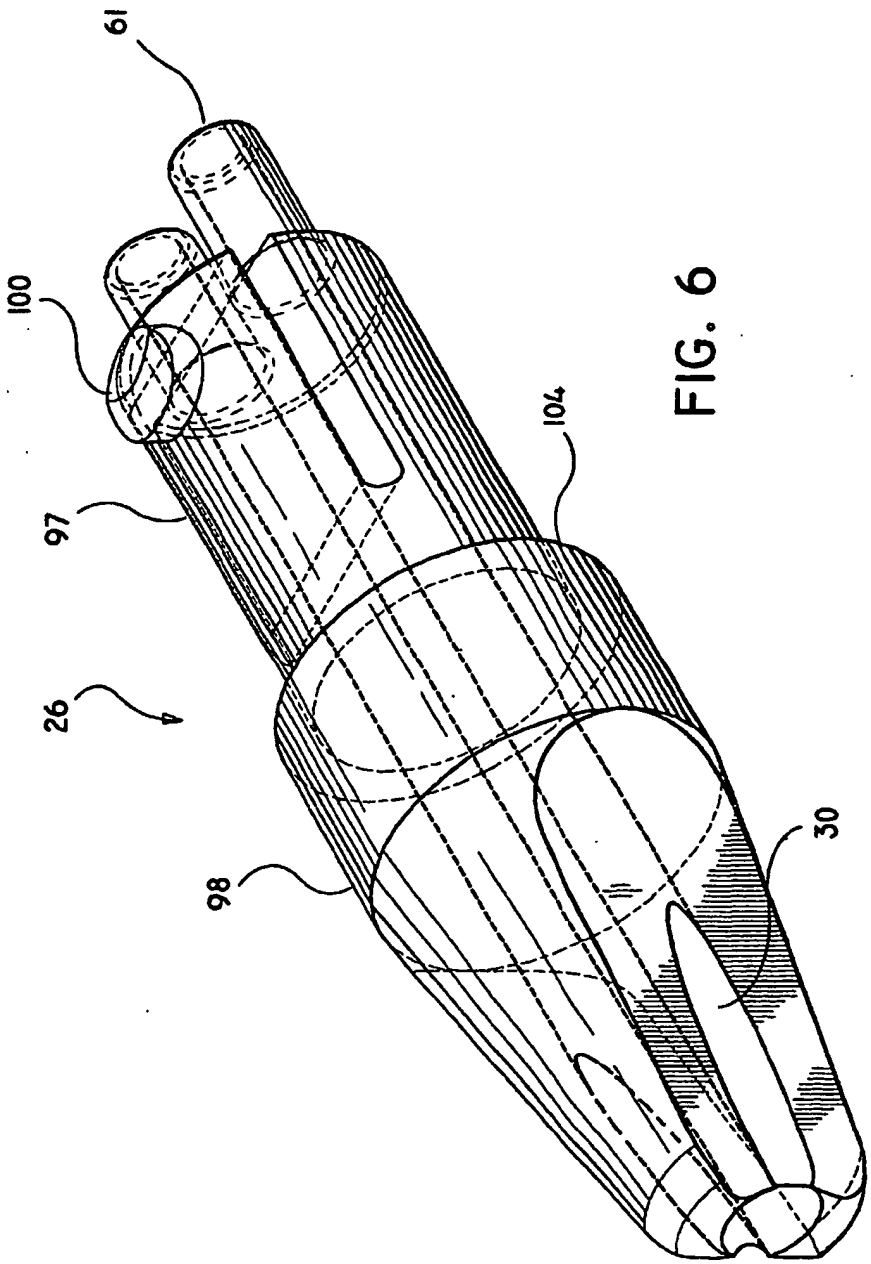

FIG. 6

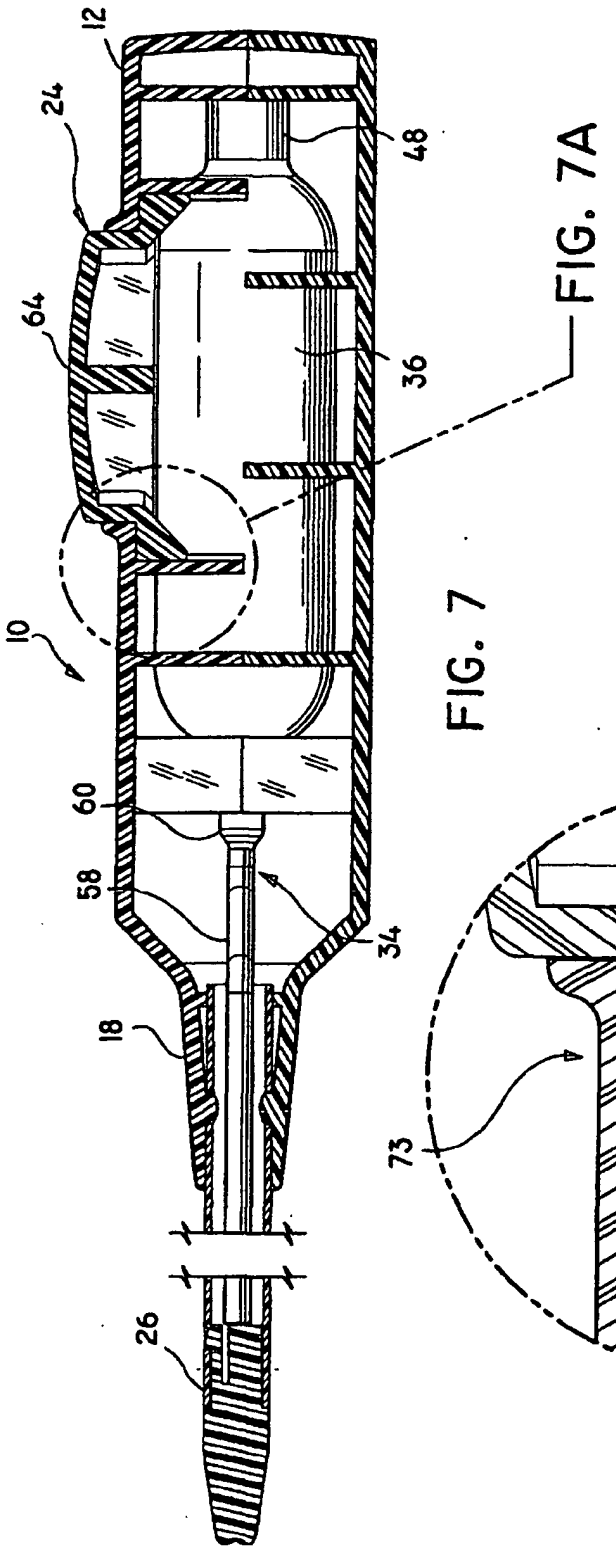

FIG. 7

FIG. 7A

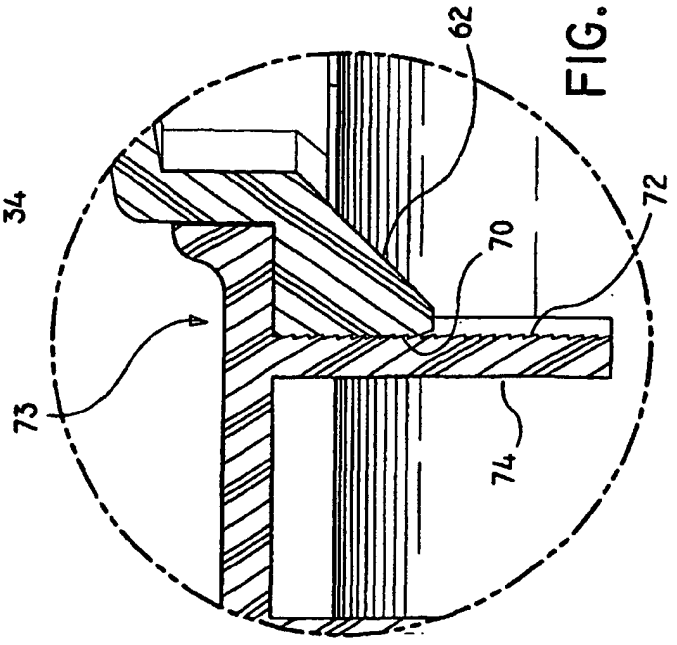

FIG. 7A

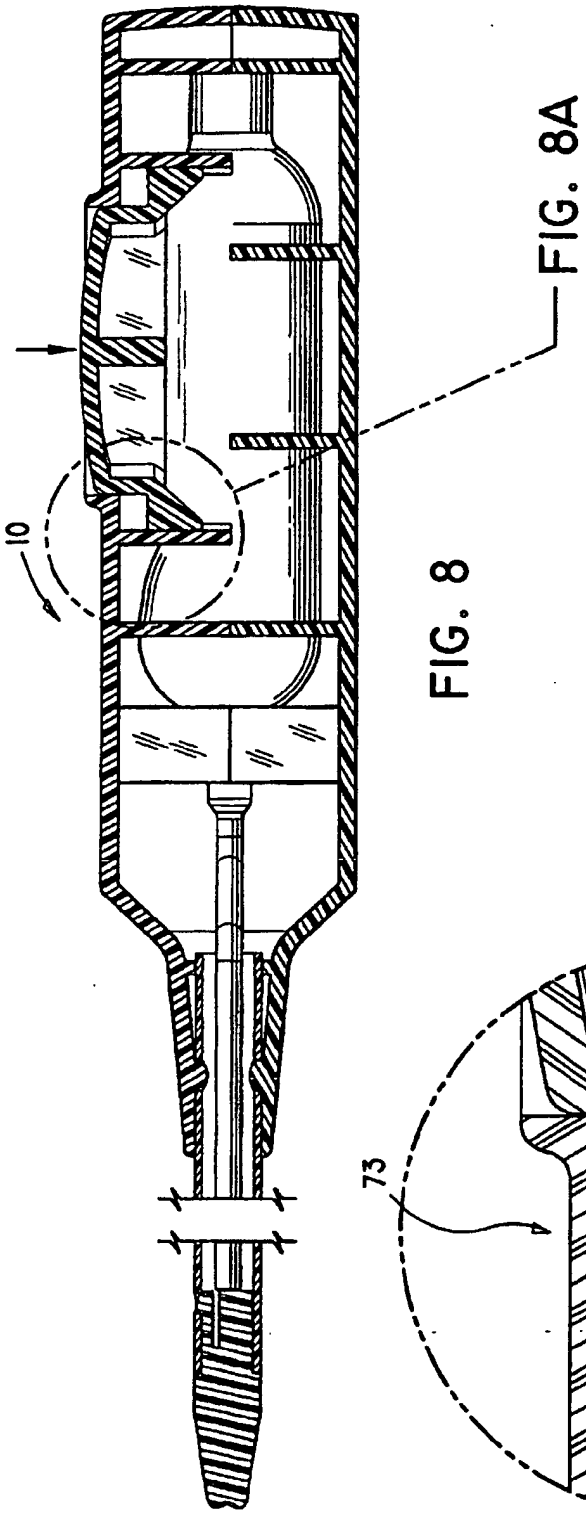

FIG. 8

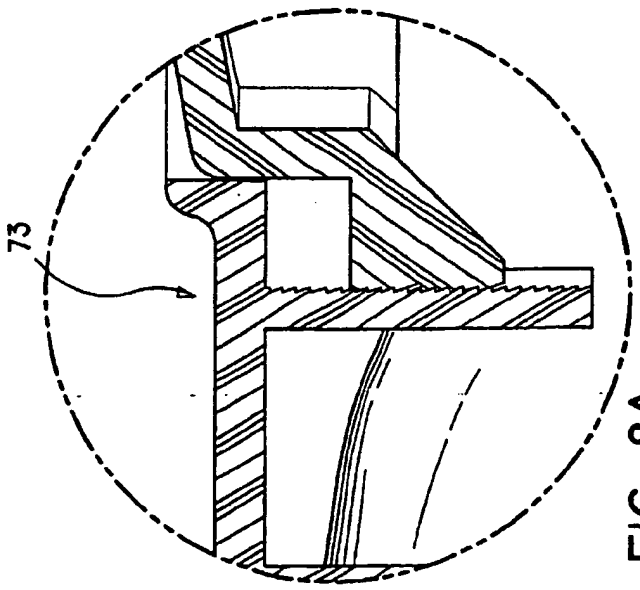

FIG. 8A

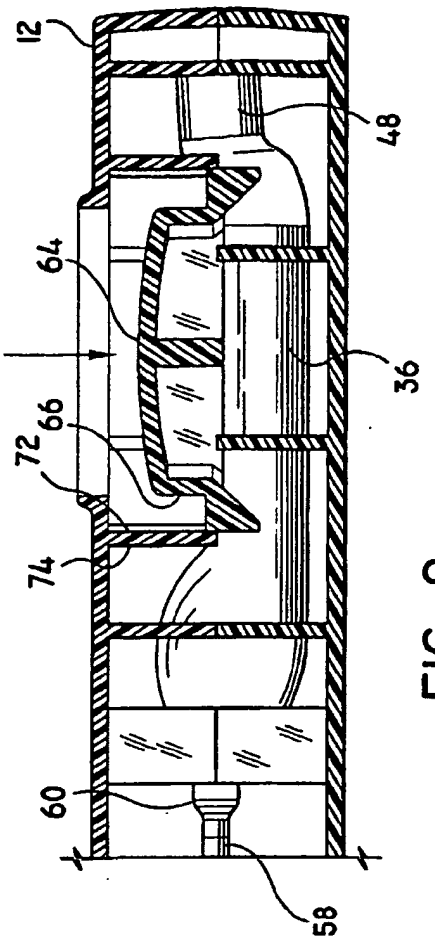

FIG. 9

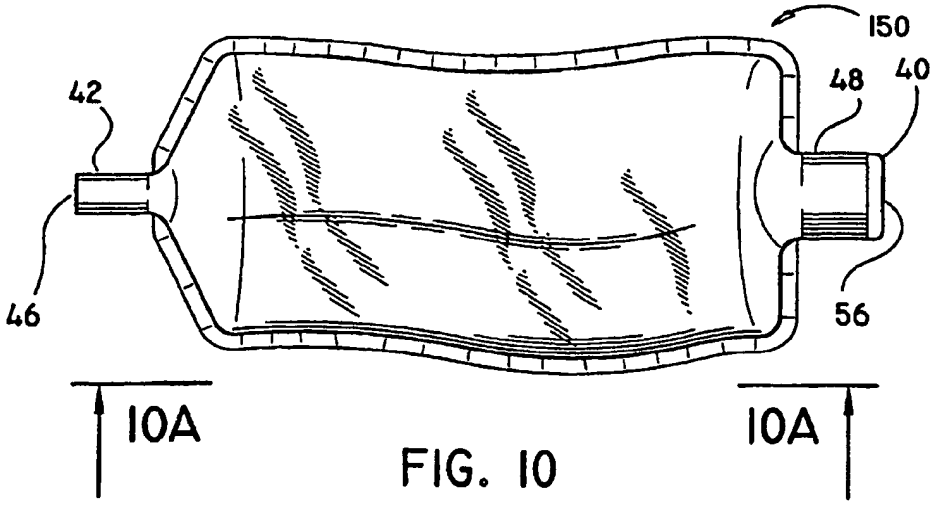

FIG. 10

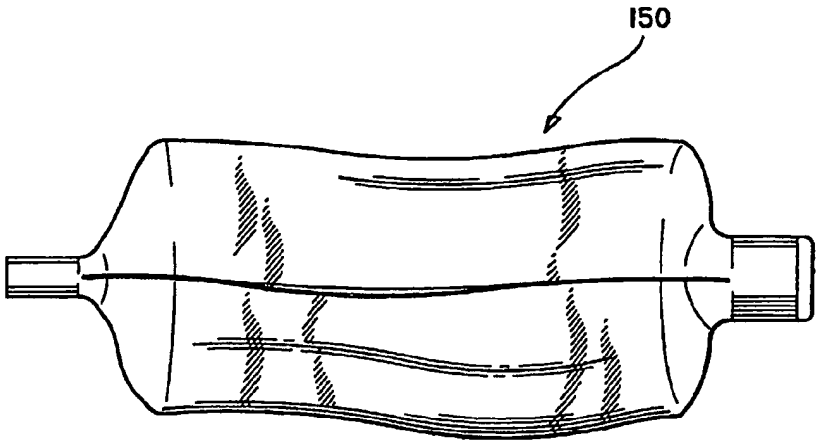

FIG. 10A

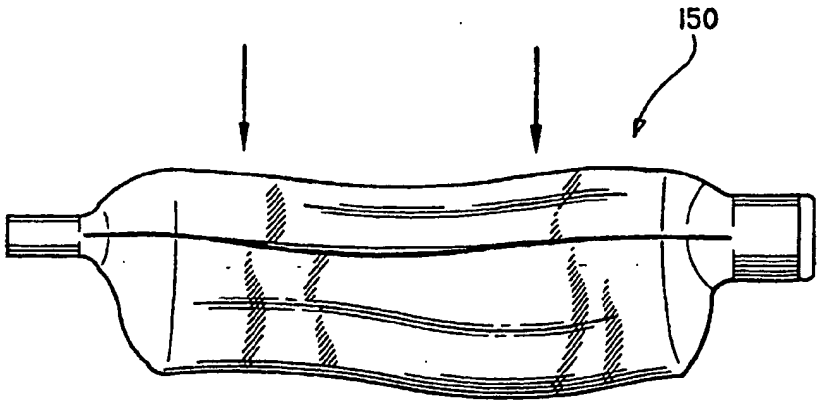

FIG. 10B

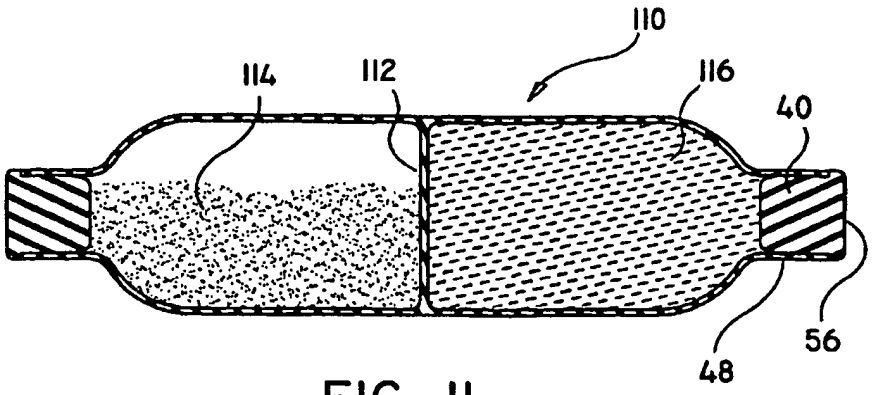

FIG. 11

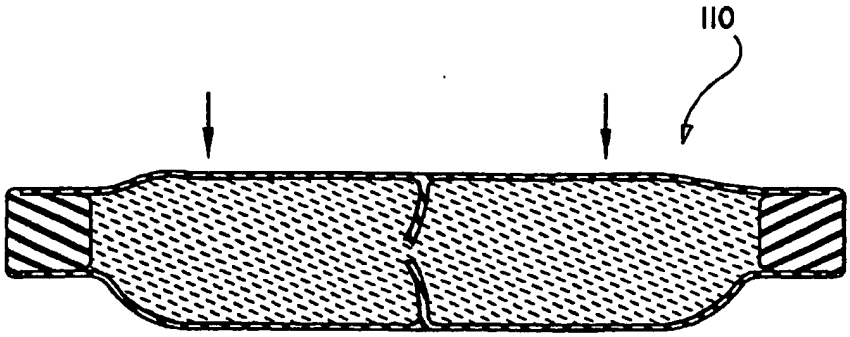

FIG. 11A

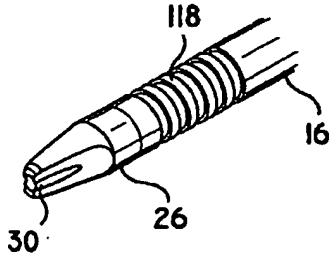

FIG. 12

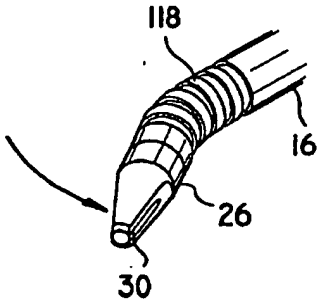

FIG. 12A

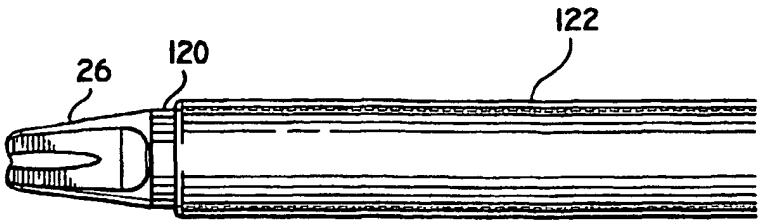

FIG. 13

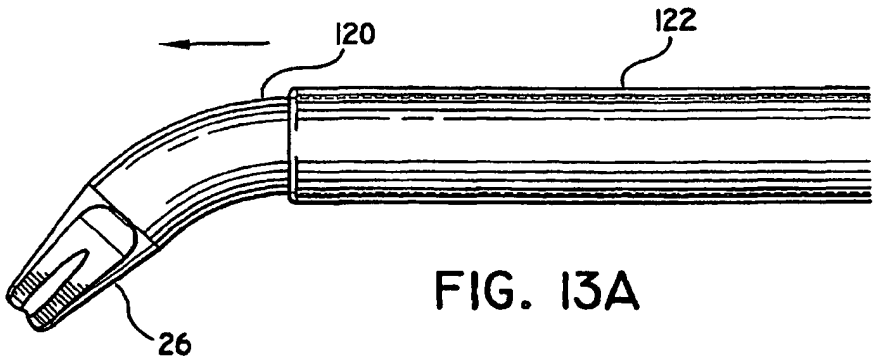

FIG. 13A

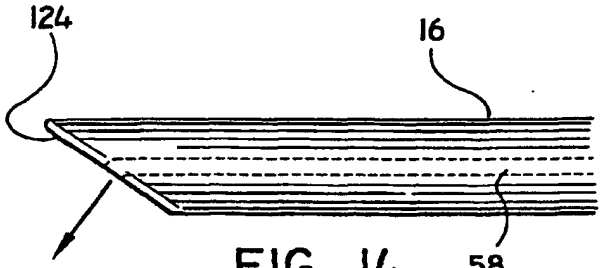

FIG. 14

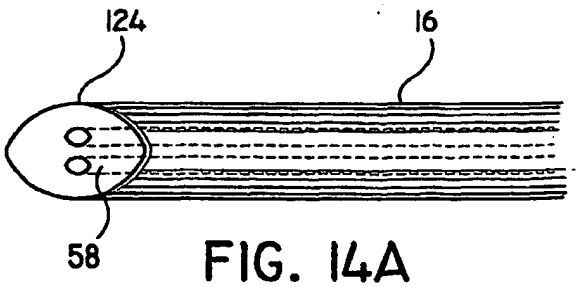

FIG. 14A

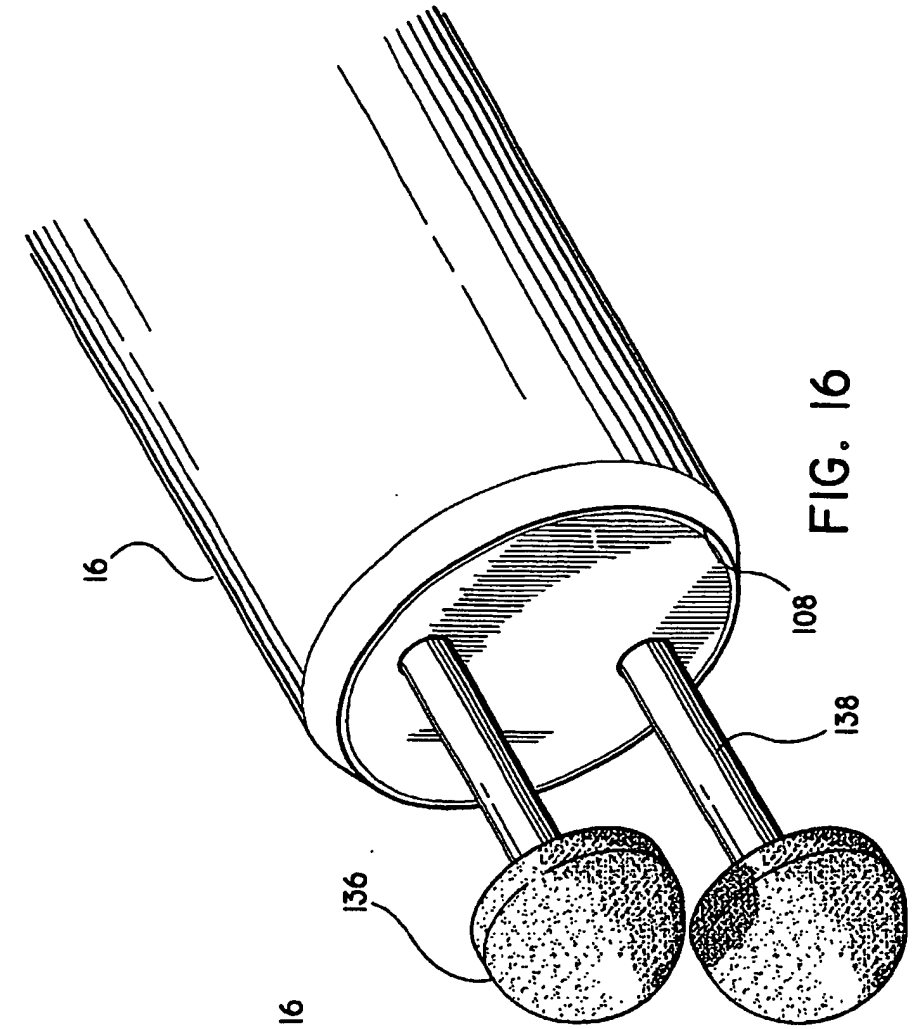

FIG. 16

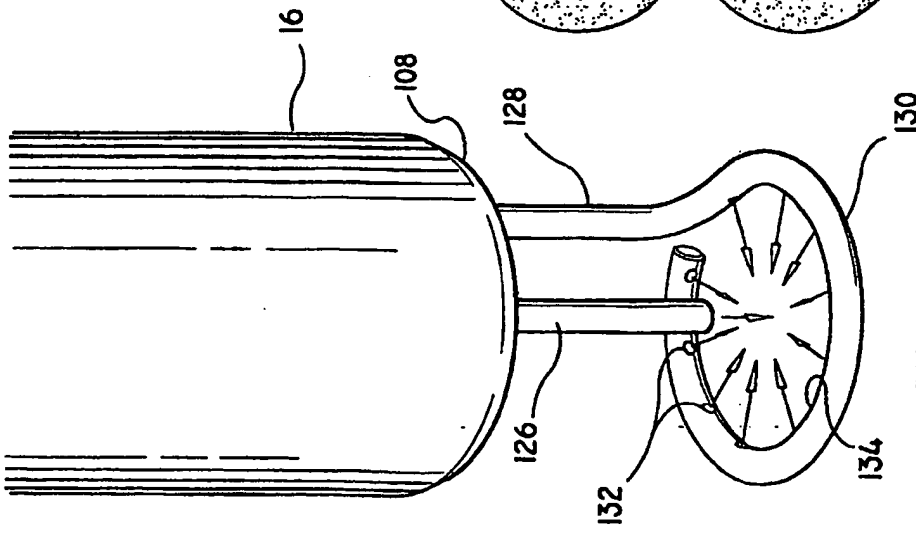

FIG. 15

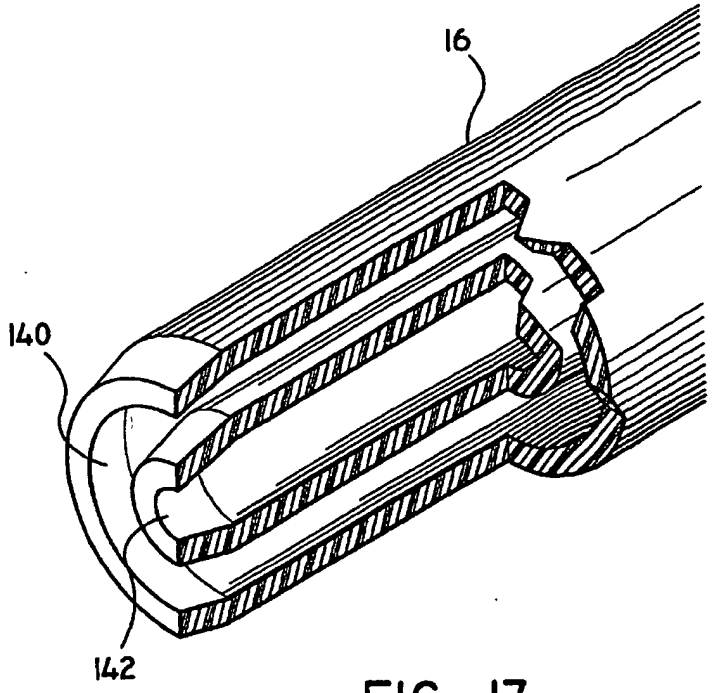

FIG. 17

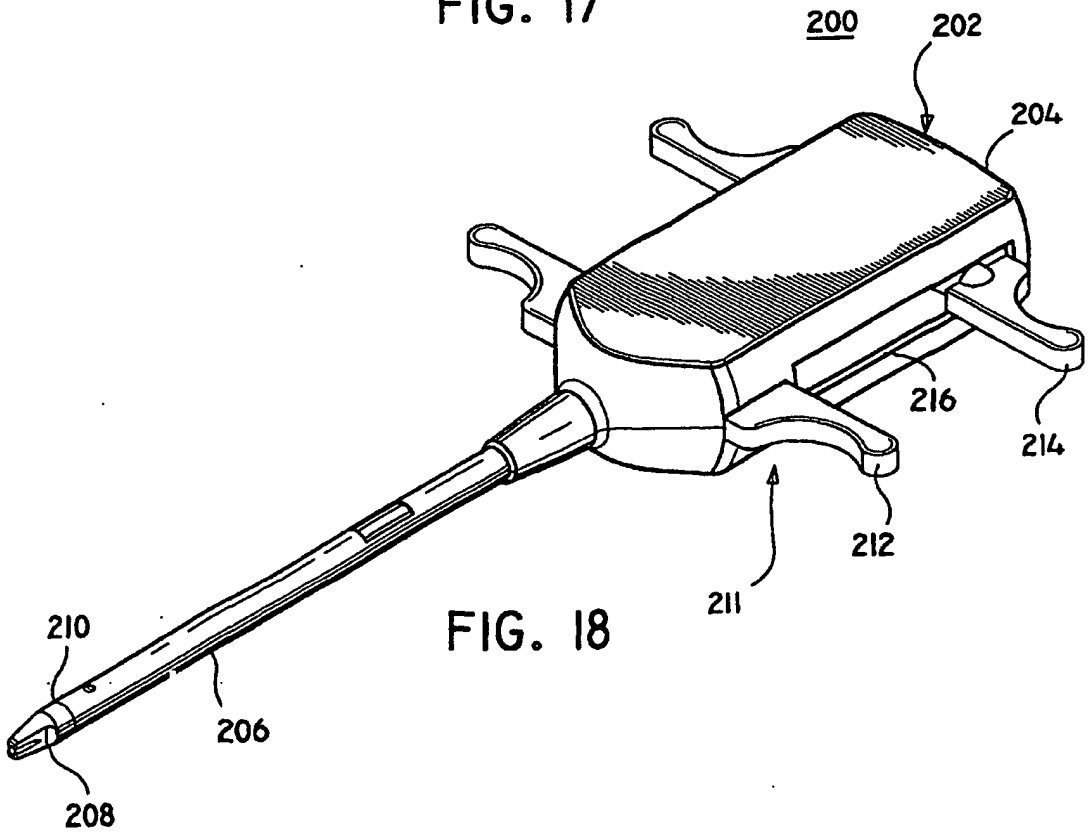

FIG. 18

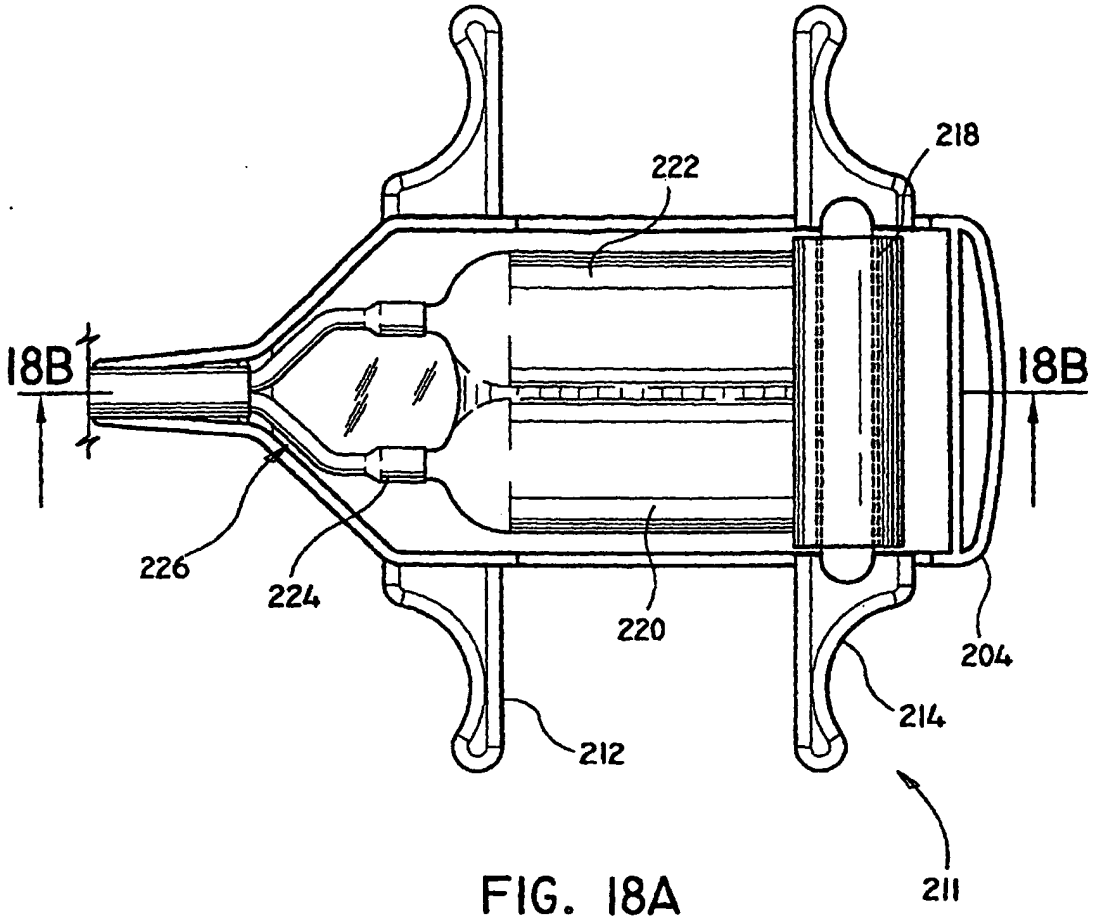

FIG. 18A

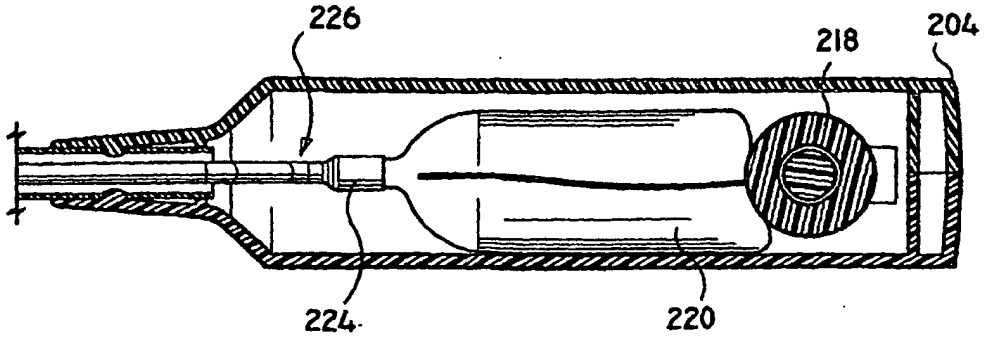

FIG. 18B

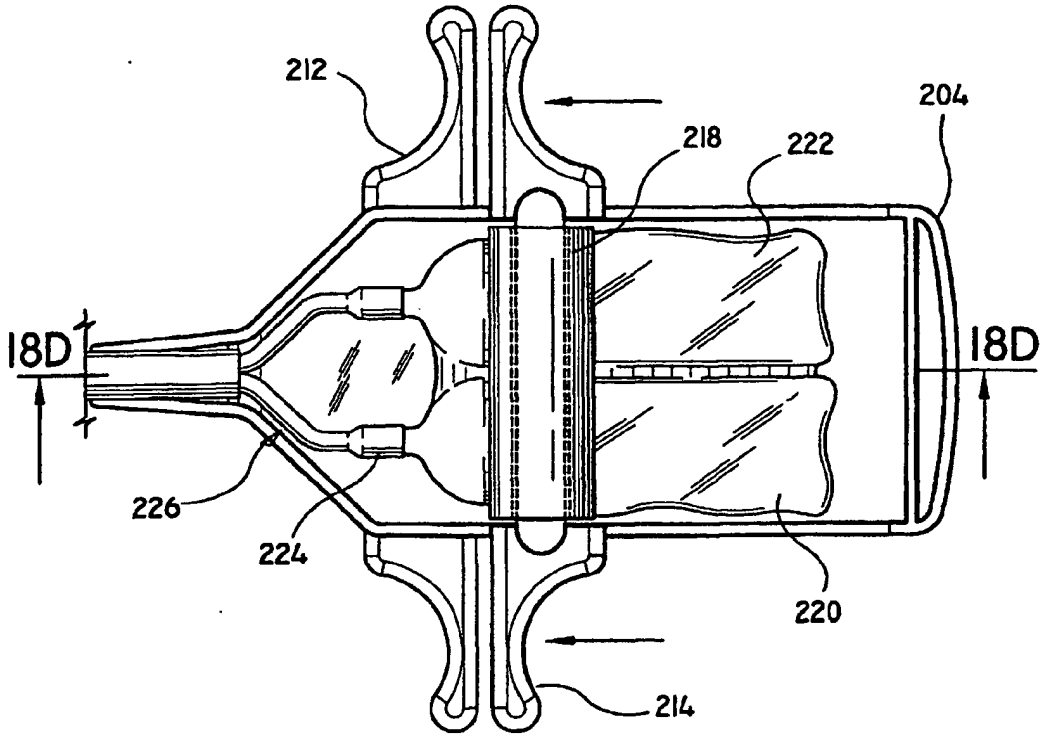

FIG. 18C

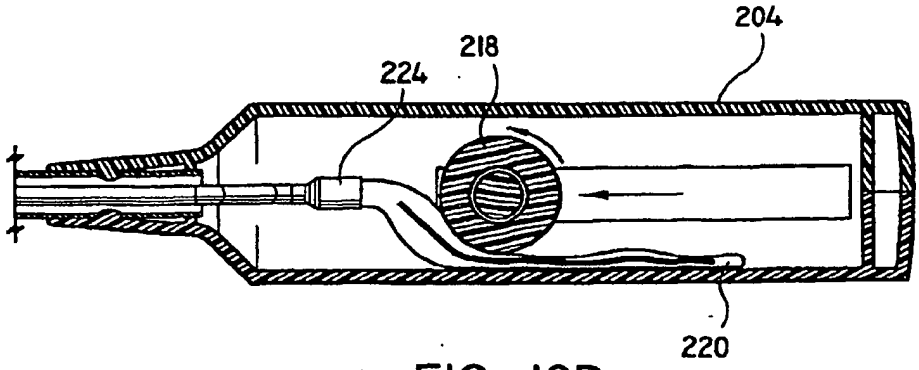

FIG. 18D

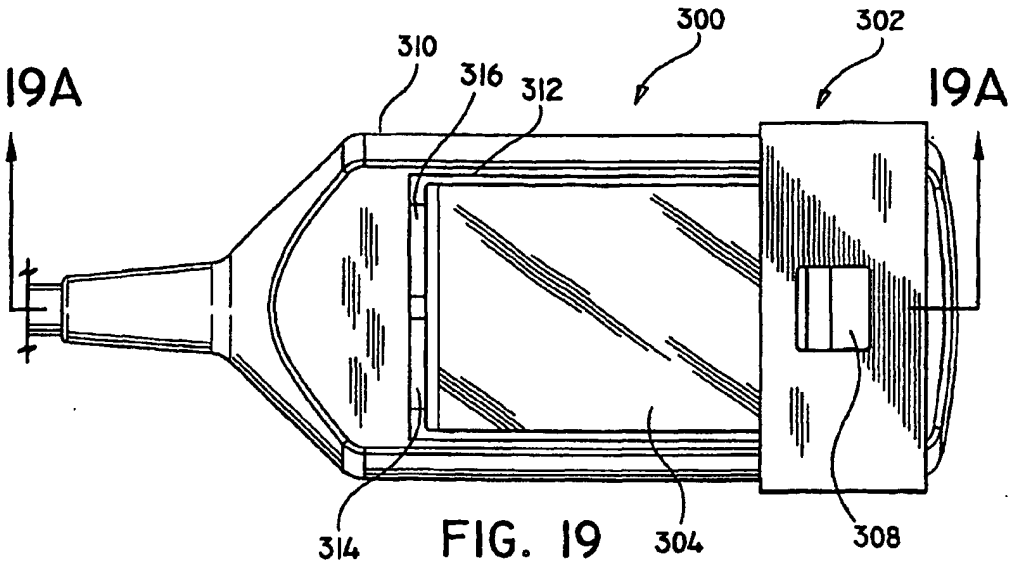

FIG. 19

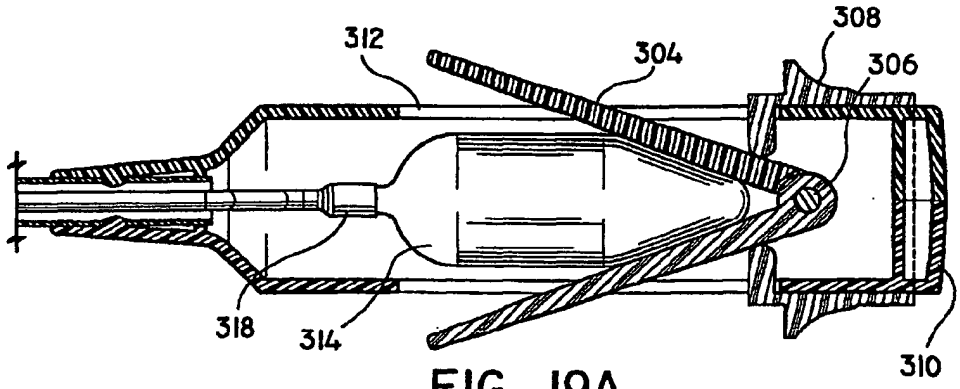

FIG. 19A

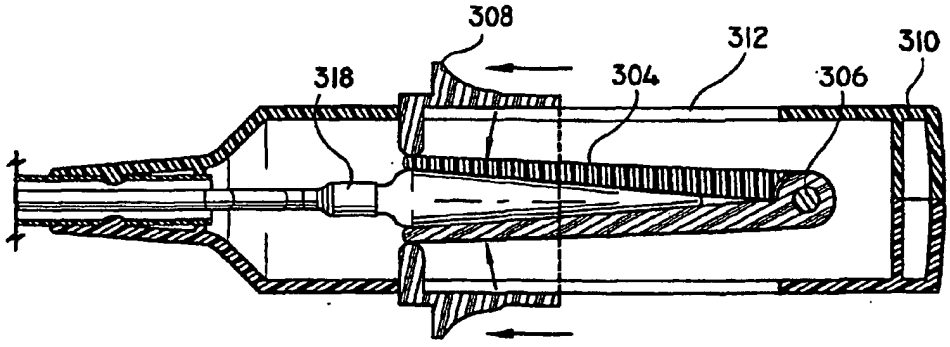

FIG. 19B